Nurses' Attitudes and Perceptions Toward Hand Hygiene in Psychiatric and Non-psychiatric Wards

ABSTRACT

Poor hand hygiene is a major contributor to hospital acquired infection. In this study, a comparison of the related attitudes of psychiatric and non-psychiatric nurses was made using a cross-sectional survey design. N=79 nurses who work in psychiatric or non-psychiatric hospital wards completed questionnaires regarding intended compliance with hand-washing protocols and potential cognitive predictors of compliance. Perceived ease of compliance and behavioural norms, and working in a non-psychiatric ward, predicted superlative intended compliance. Working in psychiatry did not in itself predict outgroup membership suggesting that psychiatric ward-related factors, rather than psychiatric nurse-related factors are most relevant in determining between-group differences. Consideration of factors unique to psychiatry wards during service design could improve compliance.

Key words: Hospital acquired infection, theory of planned behaviour, psychiatric nursing

INTRODUCTION

Approximately 7–10% of the hospital inpatient population will be affected by health care acquired infection (HCAI) during their admission (Khan et al., 2017) leading to increased costs, length of stay, morbidity, and mortality (Atack & Luke, 2008; Sharir et al., 2001). Hand hygiene practice is the single most effective method of preventing HAI (Barret & Randle, 2008; Jenner et al. 2002; Moret et al. 2004). In the wake of the COVID-19 pandemic it is more important than ever that good hand hygiene is understood and practiced across all clinical areas (Canadian Centre for Occupational Health and Safety, 2020). In most hospitals staff are well educated and aware of hand washing protocols and guidelines. In Australia, hand hygiene has been the focus of the National Hand Hygiene Initiative since 2008 (Australian Commission on Safety and Quality in Health Care [ACSQHC]). Their national audit data for November 2017 to March 2018 suggests an overall compliance rate with hand hygiene standards of 84.8%, ranging from 79.2%, after touching a patient's surroundings, to 91.9%, after a procedure or body fluid exposure risk (Hand Hygiene Australia 2018). However, these data are contestable. In research studies, hand hygiene compliance rates are suboptimal at less than 40% (Sax et al. 2007; Sharir et al., 2001) while an investigation of handwashing audits in Canada (Srigley et al., 2014) reported hand hygiene event rates to be

around three times higher in hallways within eyesight of an auditor compared with when no auditor was visible and the increase occurred after the auditors' arrival. The authors concluded that a Hawthorne effect, localised to areas where the auditor is visible,, calls into question the accuracy of publicly reported hospital hand hygiene compliance rates. In effect, hand hygiene is not a solved issue and further work is needed to promote adherence to good practice.

BACKGROUND

There is a considerable literature on infection control, but little is known about hand hygiene specifically in mental health inpatient settings (Ott & French 2009). Infection control practices in these facilities are particularly challenging as hand hygiene protocols are generally more specific to acute care facilities (Cheng et al., 2007). Nevertheless, national audit figures for Australia suggest mental health wards have among the highest hand hygiene compliance rates (87.6% compliance, range 73.9% to 92.5%). However, as noted, audit figures may overestimate compliance: a systematic review of primary research studies in all settings (Erasmus et al 2010) found a median rate of 40% compliance.

There is some evidence that, as a group, mental health nurses lack knowledge about infection control issues. In a study (Bennett & Mansell 2004) of the extent to which 543 registered nurses understood standard infection control precautions, 26% said their knowledge was 'inadequate'. Of these, 40% were mental health nurses and 50% learning disability nurses. Several factors require consideration in a mental health setting, including the risk of high alcohol-content hand hygiene products to the patient population, the availability of single rooms for isolation in cases of infection (Leggett & Williams, 2000), and lower levels of staff-patient intimate contact that would typically require hand washing (Whitby & McLaws, 2006). Nursing practices which are routine in mental health settings, such as searching patients belongings, may be relatively rare in other settings and could contribute. There is also some evidence that nurse unit managers from inpatient mental health wards benefit from undertaking a 'cleanliness champions' training programme in terms of gaining a new perspective on hygiene and making gains in terms of assertiveness with colleagues and managers (Freeman 2011).

In a study of 35 nursing staff's adherence to standard hygiene precautions in one psychiatric hospital in Brazil (Piai-Morais et al 2015) participants on average scored highly on knowledge, moderately on adherence and obstacles, and poorly on scores related to the safety

environment, training, and PPE availability. There was a strong positive correlation between the adherence and personal protective equipment availability scales. Results were limited by a very high proportion (70%+) of nursing assistants in the sample.

To date no study has compared mental health nurses with adult/general nurses in terms of their knowledge of and attitudes towards infection control. Despite a wealth of empirical research into nursing and infection control, mental health nurses are seriously under-studied. Further, there is a distinct lack of research conducted within any recognised psychological framework examining the behavioural determinants of hygiene compliance in mental health settings (Erasmus et al., 2010).

While audit figures suggest good compliance with hand hygiene among mental health staff, research highlights numerous serious inconsistencies between different evidence sources. No study has previously examined levels of cognition that might be relevant to hand hygiene among mental health nurses or compared them with colleagues in other inpatient settings. The study has the potential to highlight cognitive aspects that may be especially important in hand hygiene in mental health services and could therefore inform related training and education.

Theoretical underpinning

Promotion of hand hygiene behaviour is complex. Observed compliance with recommendations is likely influenced by gender, profession, workload, and type, tolerance, and accessibility of hand hygiene aides. Further, the importance of an organisational climate to support and modify hand hygiene behaviour has been consistently demonstrated. Compliance varies significantly among healthcare workers within the same institution suggesting that individual factors including social cognitive and psychological determinants (i.e., knowledge, attitude, intentions, beliefs, and perceptions) could play a role in determining behaviour. The application of social cognitive models in interventions to improve compliance with health-related activities has regularly resulted positive changes (Conner & Norman 1995) Such social cognitive models assume that an individual's perceptions have a strong impact on his or her behaviour and can accurately predict behaviour. The current study uses the framework of the theory of planned behaviour (TPB; Ajzen 1991) to evaluate cognitive determinants of hand hygiene behaviour. This theory has been widely applied to predict and explain behaviours and behavioural intentions in healthcare settings including to understand adherence to hand hygiene among nurses.

According to TPB, behaviour can be predicted from intention, which, in turn, is shaped by personal attitude, perceived behavioural control, and subjective norms. Thus, intention is assumed to be the most immediate factor to determine a behaviour (see Figure 1). Attitude toward a given behaviour is determined by beliefs about the consequences of the behaviour and the evaluation of these. Perceived behavioural control reflects beliefs regarding the access to resources and opportunities needed to perform a behaviour. Subjective norms represent beliefs about the expectations of important referent others toward a given behaviour. Grube et al. (1986) have also emphasized the important influence of an individual's perception of the behaviour of others, defined as behavioural norms.

Taken together, subjective and behavioural norms represent the perceived social pressure toward a behaviour. Identification of individual cognitive factors associated with intention to perform hand hygiene may help build successful promotion strategies. So far, individual cognitive factors related to hand hygiene have not been evaluated by means of a social cognitive model among mental health nursing staff.

>>***Insert Figure 1 about here***<<

Contribution of the current study

Our overall study aim is to explore hand hygiene among mental health nurses. The study report is guided by the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) Statement (von Elm et al., 2007), a 22-item checklist of items that should be included in reports of observational studies including cross-sectional studies. The purpose of the STROBE guidelines is to strengthen transparency in the analysis of and and reporting of observational studies.

Specific objectives include:

- Identify and compare cognitive facilitators (intentions, beliefs, efficacy, subjective norms, barriers), practical barriers, and personal characteristics associated with intention to comply with hand hygiene protocols among nurses working in mental health and medical settings.
- Identify and explore implications for improving hand hygiene policy, guidelines and education in mental health settings specifically which result from differences identified above.

METHODS

Design

The study employed a cross sectional and correlational survey design.

Setting & Participants

Nurses working in mental health and medical inpatient wards within a single hospital site in one Local Health District in New South Wales were eligible to participate. Sample size was informed by examination of Pessoa Silva et al's (2005) investigation. To detect a difference in Mean score of 0.5 (large effect size, 95% power, $p<0.05$) would require a sample of n=38 per group. We therefore aimed to recruit a sample of N=80 nurses, 50% each from mental health services and medical wards.

Measures

Study questionnaires were purpose-designed, informed by those used by Pessoa Silva et al.'s (2005) study of nurses working with neonates, and adapted to ensure relevance to mental health and a range of medical settings. To ensure ease of understanding across both mental health and medical settings we opted for a small range of generic scenarios (contact with patients' personal possessions, skin, mucous membranes, and bodily fluids). Questionnaires were designed to assess behavioural intention (the dependent variable), i.e., the individual's reported intention to perform hand hygiene in each scenario, and four independent variables: personal attitude i.e., the individual's positive or negative evaluation of hand hygiene utility; behavioural control, i.e., the individual's perception of the difficulty or ease with which hand hygiene can be performed; subjective norms, i.e., the individual's perception of the opinion of his or her superior toward hand hygiene; and behavioural norms i.e., the individual's perception of peer compliance with hand hygiene, in each of the four scenarios. Each aspect was measured on a 7-point unipolar Likert scale anchored by opposite statements representing complete absence and ever-presence (e.g., 'never', 'always'). Further, two additional cognitive factors were assessed as possible explanatory variables for intention to comply with hand hygiene: i) risk perception was assessed based on a single item that investigated perception of the probability of cross-transmission associated with noncompliance and ii) motivation to improve hand hygiene, measured by a single statement 'it is possible for me to improve my hand hygiene' with three possible responses (Yes, Maybe, No). Perception of risk of cross-transmission was measured using an 11-point visual analogue scale (VAS) scale with values ranging from 0 to 100 in increments of 10. Respondents were classified, as in Pessoa-Silva et al (2005), as accurately perceiving

nosocomial infection risk if they indicated probability of 50-80%. Respondents were also asked about their agreement with eight statements describing possible barriers to hand hygiene compliance. Each was measured using a 7-point bipolar Likert scale (e.g., "strongly disagree' versus 'strongly agree')..

In addition to the cognitive factors described above, the questionnaire captured demographic (professional category, duration of employment, unit type, year of award of professional qualification) information and self-reported exposure to hand hygiene publicity material.

Procedure

Ethical/governance approval was waived by South Western Sydney Local Health District Ethics Committee who advised that the project constituted service development/evaluation. Potential participants were recruited via posters and emails at the hospital site. Bearing in mind the target recruitment of 80 nurses, 40 from mental health and 40 from medical settings, questionnaires were distributed in roughly equal numbers across eligible wards (eight mental health and thirteen medical wards). NUMs were asked to bring the study to the attention of nursing staff on their ward. Participation was on a first-come, first-served basis until the unit's allocation of questionnaires was completed. Participation was confidential; however, participants could choose to complete a separate slip indicating the fact of their participation as opposed to the content. Participants were informed that they were eligible to enter a prize draw (4 cash prizes each of $50 AUD) to be selected at random. However, participation in the prize draw was not a condition of participation in the study, and, due to separation of entry slips and completed questionnaires, anonymity of specific responses was uncompromised. In total, 41 participants opted to take part in the prize draw and 38 chose not to. Consent was assumed to be implicit from completion and return of the study questionnaire.

Data analysis

Demographic data was subject to descriptive analysis (frequencies and proportions). Compliance-barrier, cognitive, and personal items data were scrutinised for normality of distribution in order to inform use of parametric or non-parametric statistics in subsequent testing. Internal reliability (Cronbach's α) of each multi-item scale was calculated and used to inform scale retention (α=0.70 was the lower boundary of acceptability of retention). Univariate and bivariate analyses were conducted to identify significant differences or relationships between variables and to inform retention for entry into multivariate analysis. Retained variables were entered into binary logistic regression as potential factors/items that

might predict high intended compliance with hand hygiene protocols. Results for nurses working in mental health and medical settings were compared to identify any significant systematic differences between the two groups. All tests of significance were set at P<.05. Analysis was performed in IBM SPSS Statistics Version 25.

RESULTS

In total, 80 completed questionnaires were returned. One had substantial amounts of missing data and was deleted listwise. The amount of missing data was very low (0.04%) and this was deleted pairwise. Sample characteristics are detailed in Table 1. There was no difference between those working in mental health versus those working in other settings in terms of their educational achievement, years of experience, or employment status. Reported '*Always*' compliance with the four hand hygiene scenarios was 75.9%, 94.9%, 93.7%, and 60.8% for *skin contact, membraneous tissue contact, bodily fluid contact,* and *contact with patients' belongings* respectively and did not differ between those in mental health and other settings. Exposure of participants to information about hand hygiene was very high (96.3% answered 'daily').

>>***Insert Table 1 about here***<<

Internal reliability of hand hygiene scenario data was conducted to explore the extent to which responses to similar stimuli under different scenarios could be treated as robust measures when amalgamated. As a result, Cronbach's alphas (α) of 0.807, 0.923, and 0.789 were revealed for ease of compliance (c), NUM approval (d), and team culture (e) respectively. Cronbach's α for performing hand hygiene in the situation (a) and utility of hand hygiene in this situation (b) were below an acceptable level (both α=0.563). However, when combined into a single scale α=0.736 and thus this measure was adopted as the outcome measure (termed *reported behaviour*). Inspection of skewness and kurtosis statistics for the resulting subscale scores revealed that all were significantly positively skewed. As a result, subsequent analyses utilised non-parametric statistics. Items relating to barriers to hand hygiene were subject to testing for internal reliability but no satisfactory combination was identified in which Cronbach's α achieved an acceptable level. As a result, these items were examined individually.

Due to the highly skewed data we examined differences in predictor variables between those who reported the very highest overall compliance with handwashing hygiene scenarios (i.e., overall mean reported compliance of 6.5+ out of 7) using the Mann Whitney U Test for non-

parametric ordinal data and the chi square test or the Fisher's exact test where appropriate for categorical data. Predictor variables were dichotomized on a case-by-case basis for personal items (see Table 2).

>>***Insert Table 2 about here***<<

Predictor variables were selected for entry into the subsequent multivariate analysis where P<0.2. Prior to multivariate analysis all predictor variables were examined for covariance and, as a result, 'lack of handrub' on the ward and 'lack of time to conduct handwashing' were removed as each correlated moderately with three other variables. Following this, seven variables were entered into a binary logistic regression of which three (Ease of compliance, Behavioural norms, and mental health nurse) contributed significantly while a fourth, subjective norms, was a borderline significant predictor (p=0.06). Chi square omnibus and Hosmer and Lemeshow test suggested the model was a good fit for the data and Nagelkerke's R2 (0.542) suggested that the model accounted for more than half of the variance in the data. The model correctly predicted membership of the very high reported compliance category for 63/65 (96.9%) individuals but only correctly predicted membership of suboptimal reported compliance for 9/14 (64.3%) of individuals (overall accuracy 91.1%). Odds ratios indicated that a 1-point change in rating of ease of compliance (easier to comply) was associated with an increased likelihood of reporting a very high intention to comply of (OR 2.26, 1.31, 3.90). A 1-point increase in perception of behavioural norms was associated with an almost fourfold improvement in relative risk of reported high intended compliance (OR 3.80, 1.46, 9.87). Working in a mental health setting was associated with a very low relative risk of reporting high intended compliance with handwashing protocols (OR 0.09, 0.01, 0.70). Subsequently, entry of the three significant variables into a forward conditional binary logistic model resulted in the contribution of work setting (mental health versus medical) falling below a level of statistical significance (P=0.08; OR 0.25, 0.06. 1.15). The proportion of variance in the model fell to 42.0% and correct classification to 82.3% (92.3% of true positives and 35.7% of true negatives). Removal of the variable perceived behavioural control (i.e., ease of compliance) would have significantly worsened the model (Change in 2 Log Likelihood 11.65; P<.001).

>>***Insert Table 3 about here***<<

To investigate any specific areas that might account for significant differences on high intended compliance between those working in mental health and other settings we examined differences in response between these groups to each scenario and for overall response on

each aspect of compliance (See Table 4). There were no statistically significant differences on any of the comparisons. Fewer mental health than medical-based nurses reported the highest level of intention to comply with protocols in all four scenarios. Finally, we examined differences between mental health and medical-based nurses on variables that trended to significance in discriminating between high and low compliers in univariate analyses but which did not survive the multivariate analysis. Only one of the five barriers to compliance identified for inclusion in the multivariate analysis in Table 2 ('there is not always enough hand rub in stock') differed significantly between mental health and medical-based respondents ($U=605.0$, $Z=-0.53$, $P<.01$). To investigate this further we examined qualitative comments on questionnaires. Eight mental health nurses spontaneously reported issues related to hand sanitising lotion in these comments while none of their counterparts in medical wards did so. Issues raised by mental health nurses ranged from the harshness of sanitiser on skin, the lack of availability on the floor due to risk of ingestion by patients, and the need for an individual to be identified and tasked with ensuring available stock and refilling of dispensers.

>>Insert Table 4 about here<<

DISCUSSION

In this study we examined the attitudes of nursing staff to hand hygiene, specifically we examined which of a range of cognitive, practical, and personal factors contributed significantly to reported compliance with hand hygiene protocols. As mental health nurses (Authors 1 & 2) we were especially interested in what role if any is played by participants' status as a mental health nurse/ working on a mental health ward relative to their medical-based colleagues. The reason for this was practical and pragmatic: we wanted to inform education, policy, and practice on hand hygiene in the mental health wards based on evidence of the key influencing factors. While groups of mental health and medical-based nurses did not differ on their intention to comply with handwashing protocols at the highest levels on an initial comparison, we did find that – after controlling for a range of variables – that differentiation between groups contributed to a model that was able to successfully discriminate between very high and less optimal compliers. However, this difference did not make a statistically significant difference when we examined the respective contributions of each variable to the whole model, while the major role was played by perceived behavioural control. As a result, we can conclude that differences between nurses based in mental health

and medical-based nurses in the intended hand hygiene compliance in the scenarios tested are very likely real but are accounted for primarily by perceived differences in how easy it is to comply with protocols in the respective settings rather than as some inherent difference . .

Examination of the variables found to differ significantly between the high and suboptimal complier groups but which did not contribute significantly in the multivariate analysis provide limited clues to reasons for the differences between mental health and medical-based nurses when examined for these groups. The only significant difference between the groups was for lack of availability of hand sanitiser on mental health wards, with qualitative comments suggesting this was possibly most likely due to patient-risk issues. The two groups also differed on their strength of agreement with an item about lack of time to perform hand hygiene with mental health-based nurses affirming this more strongly as a reason though not significantly so (P=.08). For the whole cohort in terms of predictors of hand hygiene, multivariate analyses revealed that perceived ease of compliance was the primary significant independent predictor of intended behaviour with perceived behavioural norms also a contributor.

There are a number of important limitations to the current study. We used four generic hand hygiene scenarios because of the need to ensure relevance of scenarios across groups working in mental health and a range of medical specialties. Previous studies, such as that of Pessoa-Silva et al. (2005) have used considerably more scenarios because they have investigated single, tightly defined groups of nurses, in their case nurses working with neonates. In practice, this means that investigators can generate many specific scenarios (e.g., opening incubators, feeding neonates etc.) which are not suitable for use across widely differing groups. This has at least two important potential consequences. First, the large number of scenarios is likely to boost internal reliability of resulting scale scores due to repetition; the limitation in scope regarding the number of scenarios we could generate may account for the failure for the single measure of intended behaviour to achieve a satisfactory level of internal reliability. We remedied this by combining the measure with that of attitude to handwashing with which items correlated highly resulting in a satisfactory Cronbach's alpha for the conjoined 8-item scale. Nevertheless, we cannot discount that this may have affected the external validity of the measure. Notwithstanding, the study has the common limitation of many paper-based investigations of planned behaviour which is that there is no data from a actual, observed behaviour to verify any link between intention and externalised action. As an indication, reported compliance in this study, like other similar ones, was high with an

'*Always*' response to hand hygiene on a mean 81.3% occasions across all four scenarios; a rate considerably higher than those emerging from observational studies with concealed observers. We therefore recommend that future research aims to ascertain relationships between study variables and something more akin to actual versus self-reported behaviour. A second limitation relates to the fact that, in Australia, there is no specialist mental health pre-registration training. In effect, all nurses have undertaken the same generic pre-registration training, something that may remove variance from the data that might be present in countries with more mental health focused preparation. Finally, we powered this study to detect a large, clinically self-evident effect size and results should be treated tentatively in lieu of further studies with larger samples that can verify our findings.

CONCLUSION

Our finding that, for the whole cohort in terms of predictors of hand hygiene, perceived ease of compliance was the primary significant independent predictor of intended behaviour with perceived behavioural norms also a contributor has several ramifications. Within the theory of planned behaviour (Ajzen, 1991) this suggests that ease of compliance is paramount in determining high compliance while team behavioural norms also play a role. Given the role of the nurse unit manager in setting the tone for the culture of the ward this strongly supports previous evidence emphasising the importance of supporting unit managers with hand hygiene culture (Freeman, 2011). It is of equivalent importance that, in mental health settings as well as in medical settings, efforts should be made to develop, foster, and support a team ethic around hand hygiene, and to ensure that access to the means of handwashing is maximised. Qualitative data from free text portions of our questionnaire highlight that issues in mental health settings including restriction of alcohol-based hand sanitisers for risk management purposes may need more robust and consistently applied solutions.

RELEVANCE TO CLINICAL PRACTICE

As identified above, the current study results emphasise the relevance of hand hygiene for mental health settings. The important respective roles of behavioural norms and perceived ease of compliance should be given serious consideration in mental health settings. Steps should be taken to strengthen hand hygiene culture in mental health wards: this might be part of a broader effort to improve other important care aspects such as safety culture, medication safety, and improved physical health monitoring. The emphasised importance of ease of

compliance suggests a need to implement solutions to what was, at least in this study, a problem perceived by nurses in mental health settings as more pressing then by those in medical settings.

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Table 1: Participant characteristics (N=79)

		n (%)
Job Title	Registered Nurse	64 (80.0)
	Nurse Unit Manager	1 (1.3)
	Clinical Nurse Specialist/ Educator	5 (6.3)
	Enrolled Nurse	6 (7.5)
	RN/Midwife	2 (2.6)
	Not reported	1 (1.3)
Education	Up to BN	65 (82.3)
	Post BN	14 (16.7)
Area of employment	Mental Health	40 (50.6)
	Medical	39 (49.4)
Years nursing experience	0-2	15 (19.0)
	3-5	26 (32.9)
	6-10	15 (19.0)
	11+	23 (29.1)
Employment	FT	69 (86.3)
	PT/Bank/Casual	10 (13.7)
Exposure to hand hygiene information/ posters	Daily	76 (96.3)
	Weekly	1 (1.3)
	Monthly	2 (2.5)

Table 2: Variables associated with very high intended compliance (6.5+) to perform hand hygiene across all scenarios (N=79 except * N=78)

		Outcome 6.5+ M(SD)	**Outcome <6.5 M (SD)**	**U**	***Z***	***P***
Barriers to compliance (1 Agree, 7 Disagree)						
a.	My hands are damaged	5.35 (1.97)	5.57 (1.45)	449.0	0.08	.94
b.	Prefer to use gloves	4.54 (2.31)	3.85	360.5	-0.86	.39
c.	I don't always remember	6.02 (1.56)	5.29 (1.27)	284.0	-2.39	**.02**
d.	Not enough time	5.56 (1.87)	4.14 (1.75)	256.0	-2.67	**<.01**
e.	Sink is too far away	6.11 (1.65)	4.57 (2.03)	260.5	-2.80	**<.01**
f.	Not enough hand rub in stock	6.11 (1.69)	5.43 (1.91)	335.5	-1.82	**.07**
g.	Hand hygiene interferes with therapeutic care	6.51 (1.29)	6.29 (0.91)	330.0	-2.14	**<.05**
h.	Not necessary for my patient group	6.75 (0.64)	6.43 (1.02)	393.0	-1.17	.24-
Cognitive elements						
i.	Perceived Behavioural Control [1= Difficult, 7= Easy]	5.8 (1.56)	4.03 (1.53)	167.0	-3.77	**<0.001**
j.	Perceived Subjective norm (NUM would approve of handwashing) [1 Not at all 7 Completely]	6.08 (1.81)	6.07 (1.51)	324.5	-1.87	**.06**
k.	Perceived Behavioural norm (Colleagues would wash hands in this situation) >=6.5 [1 Never, 7 Always]	6.09 (0.91)	5.25 (0.74)	212.5		**<0.01**
		Prop-ortion (%)	**Prop-ortion (%)**	**Chi Square**		***P***
Personal factors						
l.	Education BN+ vs. < BN+	18/66 (27.3)	4/14 (28.6)	[a]		1.00
m.	MHN vs Medical	30/66 (45.5)	10/14 (71.4)	2.17		**0.14**
n.	<5 Years a Nurse vs 5+ Years a Nurse	33/66 (50.0)	7/14 (50.0)	0.00		1.00
o.	Employment status FT vs. Other	58/66 (87.9)	12/14 (85.7)	[a]		1.00
p.	Change efficacy (I can increase my compliance with hand hygiene) Yes vs. Possibly	55/66 (83.3)	12/14 (85.7)	0.14		1.00[a]
q.	Knowledge (Identifies % HAI due to bacterial contamination of hands)	38/65 (58.5)	9/14 (64.3)	[a]		1.00

[a] Fisher's exact test. **Bold text P** = selected for entry into binary logistic regression

Table 3: Binary logistic regression of variables predicting high intended hand hygiene compliance

	B (SE)	***EXP(B)***	***P***
Perceived behavioural control (Ease of compliance)	0.82 (0.28)	2.26 (1.31, 3.90)	0.003
Subjective norms (NUM approval)	0.62 (0.33)	1.86 (0.98, 3.52)	0.06
Behavioural norms (Team hand hygiene culture)	1.34 (0.49)	3.80 (01.46, 9.87)	0.006
Mental health based	-2.46 (1.07)	0.09 (0.01, 0.70)	0.02
'Don't always remember'	0.43 (0.28)	1.55 (0.89, 2.68)	0.12
'Sink is too far away'	0.15 (0.23)	1.17 (0.78, 1.75)	0.45
'Interferes with care'	0.01 (0.53)	1.01 (0.36, 2.85)	0.98

[a]Mental Health Setting

Table 4: High compliance (6.5+) for cognitive elements under all four scenarios and per cognitive element

Scenario:	**Skin Contact**		**Mucous membranes contact**		**Body fluids contact**		**Personal belongings contact**		**Overall cognitive element compliance M=6.5+**			
									M 6.5+		**Range**	
Clinical Setting: *Compliance*	***Mental Health***	***Medical***	***Mental Health***	***Medical***	***Mental Health***	***Medical***	***Mental Health***	***Medical***	***Mental Health***	***Medical***	***Mental Health***	***Medical***
Intention to comply	27/40 (67.5)	33/39 (84.6)	37/40 (92.5)	38/39 (97.4)	37/40 (92.5)	37/39 (94.9)	23/40 (57.5)	25/39 (64.1)	31/40 5.30 (6.9)	32/39 5.20(6.8)	5.0-7.0	5.5-7.0
Attitude to compliance	32/40 (80.0)	37/39 (94.9)	36/40 (90.0)	37/39 (94.9)	37/40 (92.5)	39/39 (100.0)	30/40 (75.0)	28/39 (71.8)	33/40 6.80(0.38)	38/39 6.90 (0.29)	5.75-7.0	5.0-7.0
Ease of compliance	29/40 (72.5)	34/39 (87.2)	23/40 (57.5)	27/39 (69.2)	24/40 (60.0)	28/39 (71.8)	18/40 (45.0)	22/39 (56.4)	15/40 5.36 (1.74)	18/39 5.62(1.64)	1.75-7.0	1.0-7.0
Subjective norms	31/40 (77.5)	35/39 (89.7)	30/40 (75.0)	36/39 (92.3)	28/40 (70.0)	35/39 (89.7)	23/40 (57.5)	27/39 (69.2)	27/40 5.78(1.97)	31/40 6.38(1.46)	1.0-7.0	1.0-7.0
Behavioural norms	15/40 (37.5)	14/39 (35.9)	21/40 (52.5)	22/39 (56.4)	24/40 (60.0)	23/39 (59.0)	15/40 (37.5)	13/39 (33.3)	17/40 5.96(0.93)	14/40 5.93(0.95)	4.0-7.0	3.25-7.0
Scenario Compliance M>6.5	16/40 (40.0)	17/39 (43.5)	33/40 (82.5)	33/39 (84.6)	15/40 (37.5)	18/39 (30.3)	15/40 (37.5)	14/39 (35.9)				
M(SD)	6.02(0.90)	6.12 (0.80)	6.79(0.38)	6.85(0.29)	5.36(1.74)	5.62(1.64)	6.0(0.99)	5.88(0.99)				
Range	3.8 – 7.0	4.2 – 7.0	5.75 – 7.0	5.0 – 7.0	1.75 – 7.0	1.0 -7.0	4.0-7.0	3.0-7.0				

Figure 1; Theory of Planned Behaviour Ajzen 1991